# Barriers to Electronic Health Record Use during Patient Visits

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## Abstract

*The effectiveness of electronic health record (EHR)-based clinical decision support is limited when clinicians do not interact with the EHR during patient visits. To assess EHR use during ambulatory visits and determine barriers to such use, we performed a cross-sectional survey of 501 primary care clinicians. Of 225 respondents, 53 (24%) never or only sometimes used any EHR functionality during patient visits. Non-physician clinicians (e.g., nurse practitioners) were marginally more likely to be EHR non-users than physicians (39% versus 21%, respectively; p = .05). The most commonly reported barriers to using the EHR during patient visits were loss of eye contact with patients (62%), falling behind schedule (52%), computers being too slow (49%), inability to type quickly enough (32%), feeling that using the computer in front of the patient is rude (31%), and preferring to write long prose notes (28%). EHR developers and healthcare system leaders must address social, workflow, technical, and professional barriers if clinicians are to use EHRs in the presence of patients and realize the full potential of ambulatory clinical decision support.*

## Background

Clinical decision support systems have the potential to improve healthcare safety, quality, and patient outcomes.[1,2] A recent systematic review found several factors associated with the success of clinical decision support systems, including automatic provision of decision support during clinician workflow, provision of decision support at the time and location of decision making, and computer-based decision support.[3] Given these factors, clinical decision support in the ambulatory setting should be most effective when provided within an electronic health record (EHR) and accessed during patient visits.[4]

However, even in clinics with advanced EHRs, if clinicians have limited or no interaction with the EHR during visits, the effectiveness of EHR-based clinical decision support is necessarily limited. In particular, clinical decision support for acute problems needs to be presented, seen, and acted on during the patient visit.[5]

We performed a cross-sectional survey of primary care clinicians with three main goals: 1) to assess clinicians' EHR use during patient visits; 2) to identify characteristics of clinicians who do not use the EHR during patient visits and characteristics of clinicians who use the EHR intensively during patient visits; and 3) identify perceived barriers to EHR use during patient visits. Identification of characteristics of clinicians who do not use EHRs during patient visits could allow targeted interventions to increase the use of EHRs during patient visits. Understanding physician barriers to EHR use during patient visits will help developers and healthcare leaders address these barriers.

## Methods

*Setting and Electronic Health Record*
Partners HealthCare is a regional, integrated health delivery system that includes 21 primary care clinics, affiliated with either Massachusetts General Hospital or Brigham and Women's Hospital, that use the electronic Longitudinal Medical Record (LMR) as the official ambulatory health record. The LMR is an internally developed, web-based, fully functioning EHR that includes notes from primary care and subspecialty clinics; hospital discharge summaries; ICD-9 coded problem lists; health maintenance lists; medication prescribing; coded allergies; lab and radiographic results; and results management. The LMR has clinical decision support in the form of reminders for preventative services and management of chronic problems; medication prescribing alerts; and decision support during results management. The LMR and its clinical decision support is designed to be used before, during, and after patient visits. Reminders are designed to be easily visible on patients' Summary page, the first page generally viewed on "entering" a patient's chart.

During patient visits, clinicians can use the LMR to review patient data, document history and physical examination findings, access reference information, and prescribe medications. Many clinics employ a printed "mini-face sheet" that lists patient problems, allergies, medications, health maintenance history (vaccinations, cancer screening), and reminders.

*Survey*

We sent an electronic survey invitation, via email, to all 501 primary care providers at Massachusetts General Hospital and Brigham and Women's Hospital primary care clinics that use the LMR. We sent up to 3 reminders to non-respondents. Respondents were given a $20 gift certificate to an online bookstore for participating.

The survey asked about basic demographic information, whether they were a physician or a non-physician clinician (e.g., nurse practitioner), whether they were a trainee, the average number of patients seen in a clinic session, the number of clinic sessions per week, and primary hospital affiliation. We asked clinicians whether they felt they were experienced EHR users. We asked clinicians specifically what EHR functionality they used during visits. Clinicians could respond that they "never," "sometimes," "usually," or "always" used a particular EHR function. We asked clinicians about their perceived barriers to using the EHR during patient visits. We provided a list of potential barriers drawn from prior studies and our own experience, and we encouraged respondents to provide free-text answers.[6-8]

*Data Analysis*

We dichotomized respondents into those who usually or always used at least one EHR function during patient visits ("users") and those who never or only sometimes used all EHR functions during patient visits ("non-users"). This served to identify a group of respondents, the non-users, who do not interact with the EHR much during patient visits.

Although we were more interested in identifying characteristics of non-users, we also dichotomized all respondents into those who usually or always complete their EHR documentation during visits ("complete documenters") and those who never or rarely completed their documentation during visits ("deferred documenters"). This served to identify a group of respondents, the "complete documenters," who more intensively use the EHR during visits.

Conceptually, this allowed us to identify 3 mutually exclusive levels of intensity of EHR use during patient visits: non-use (non-users), moderate use (users but not complete documenters), and intensive use (complete documenters). For analysis purposes, we focused on the non-users and the complete documenters.

*Statistical Analysis*

We used standard descriptive statistics. Respondents were not required to answer every question, resulting in different sample sizes for different variables. All proportions represent the percentages of respondents for a given variable.

We used Fisher's exact test to compare categorical variables and Student's t-test to compare continuous variables. All statistical analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC). Two-sided P values less than 0.05 were considered significant. The Institutional Review Board of Partners HealthCare approved the study protocol.

**Results**

*Characteristics of Respondents*

After up to 3 reminders, we received responses from 225 clinicians (response rate 45%). Respondents had a mean age of 39 years old and were 40% men. Respondents were 197 physicians (88%), 24 nurse practitioners (11%), and 4 other clinician types (2%), including registered nurses and licensed practical nurses. Trainees – interns, residents, and fellows – made up 92 (41%) of respondents.

*EHR Use and Non-use during Visits*

Clinicians reported how often they performed various activities during patient visits (**Table 1**). The most commonly reported EHR activities during patient visits were correcting or updating the medication list and writing at least part of the note. The most commonly reported "other" EHR functionality used during visits were updating or reviewing allergy (17 mentions), family history (11), social history (11), and immunization (7) information.

Many respondents used paper to take notes during the visit. Sixty-three of 210 respondents (30%) usually or always wrote on the mini-face sheet and 64 of 213 (30%) wrote on a blank piece of paper. In all, 103 of 225 respondents (46%) reported at least sometimes writing on paper during the visit.

*Characteristics of EHR "Non-Users"*

We dichotomized respondents into those who usually or always used at least one EHR function during visits (172 [76%]; "users") and those who never or only sometimes used all EHR functions (53 [24%]; "non-users"). Non-physicians were marginally more likely to be non-users than physicians (39% of non-physicians versus 21% of physicians; p = .05; **Table 2**). There were no differences between users and non-users based on age, gender, trainee status, self-reported EHR experience, workload, or primary hospital affiliation.

*Characteristics of EHR "Intensive Users"*

As a proxy for those who use the EHR intensively during patient visits, we also dichotomized respondents into complete documenters (47 [21%]), and deferred documenters (178 [79%]). Trainees were more likely to be complete documenters compared to non-trainees (28% of trainees versus 16% of non-trainees; p = .03; **Table 2**). Those who

**Table 1: Reported Activities during Patient Visits***

| During the visit, do you… | N | Never | Sometimes | Usually | Always |
|---|---|---|---|---|---|
| | | | N (%) | | |
| **Electronic health record use** | | | | | |
| Correct/update the medication list? | 221 | 24 (11) | 45 (20) | 85 (38) | 67 (30) |
| Write at least part of the note? | 220 | 65 (30) | 59 (27) | 48 (22) | 48 (22) |
| Correct/update the problem list? | 221 | 53 (24) | 95 (43) | 52 (24) | 21 (10) |
| Correct/update health maintenance information? | 221 | 60 (27) | 97 (44) | 47 (21) | 17 (8) |
| Write full notes? | 218 | 116 (53) | 55 (25) | 25 (11) | 22 (10) |
| Modify the last note or template? | 217 | 103 (47) | 68 (31) | 31 (14) | 15 (7) |
| Correct/update other parts of the LMR? | 191 | 102 (53) | 50 (26) | 30 (16) | 9 (5) |
| **Paper Use** | | | | | |
| Write on the mini face sheet? | 210 | 105 (50) | 42 (20) | 21 (10) | 42 (20) |
| Write on a blank piece of paper? | 213 | 74 (35) | 75 (35) | 32 (15) | 32 (15) |

*Rows may not add to 100% because of rounding.

rated themselves as more experienced in using the EHR were more likely to be complete documenters compared to those who rated themselves as less experienced (25% versus 10%, respectively; p = .02). There was no difference between complete documenters and deferred documenters with respect to age, gender, physician status, workload, or hospital affiliation.

*Barriers to EHR Use*

The most commonly selected listed reasons for not using the EHR during patient visits were loss of eye contact with patient (139; 62%), falling behind schedule (117; 52%), computers being too slow (110; 49%), inability to type quickly enough (72; 32%), feeling that using the computer in front of the patient is rude (70; 31%), and preferring to write long prose notes (63; 28%). Less commonly indicated barriers included computers "timing out" (43; 19%), a lack of fast, available printers (26; 12%), pop-up blocking software that interfered with the EHR (17; 8%), and a lack of computers in some exam rooms (9; 4%).

In addition, 40 (18%) of respondents listed other reasons for not using the EHR. Of those, 14 (35%) mentioned specific EHR usability issues. The most commonly mentioned usability issue concerned LMR screen navigation and not being able to access other functionality while writing a note. Five respondents (13%) expressed concern about losing data. Other comments included a desire "to concentrate separately on patients' needs and needs of documentation," that the physical layout of the room is not conducive to using the computer while interviewing the patient, and the challenge of interacting with the patient and documenting the visit in different languages.

**Discussion**

EHR-based clinical decision support has the potential to improve the quality and safety of medical care. The greatest overall barrier to the use of EHR-based clinical decision support is the disappointingly slow uptake of EHRs.[9-11] However, even for clinicians using advanced EHRs, clinical decision support has demonstrated mixed effectiveness.[12-15] Computerized clinical decision support may be ineffective due to high workloads, inapplicability to a given situation, or inadequate clinician training.[6] An additional reason for the limited success of EHR-based clinical decision support may be that clinicians are not using the EHR when decision support has the potential to be most effective, during patient visits.[3]

In our health system, with an advanced EHR, we identified 3 levels of intensity of EHR use during patient visits: non-use, moderate use, and intensive use, representing roughly 25%, 50%, and 25% of clinicians, respectively. We found that non-physicians were marginally more likely to be non-users but that no other factor predicted non-use. We also found that trainees and clinicians who rated themselves as relatively more experienced with the EHR were more likely to be complete documenters. We found a trend towards physicians more commonly being complete documenters than non-physicians.

In a supplemental analysis, we found that trainees, despite being younger and all physicians, did not more frequently rate themselves as experienced LMR users. A potential explanation is that younger clinicians may be used to adjusting their work habits to computer systems, and may have better computer skills with which to use an EHR. We were surprised to find that workload was not associated with non-use or intensive use, given the previous findings of others.[6, 16]

Clinicians cited social, workflow, technical, and professional barriers to using the EHR with patients. From a social standpoint, although clinicians are concerned about losing eye contact and feeling that using a computer in front of patients is rude, other studies have found that computer use does not

**Table 2: Sample Characteristics and Association with Non-Use and Complete Documentation**

| Characteristic | N | Sample | Non-Users | P Value | Complete Documenters | P Value |
|---|---|---|---|---|---|---|
| **Age**, mean in years (±SD) | 223 | 39(±11) | 41(±13) | .35 | 38 (±12) | .25 |
| | | N (%) | N (%) | | N (%) | |
| **Gender** | 225 | | | .34 | | .10 |
| Men | | 90 (40) | 18 (20) | | 24 (27) | |
| Women | | 135 (60) | 35 (26) | | 23 (17) | |
| **Trainee status** | 225 | | | .87 | | .03 |
| Trainee | | 92 (41) | 21 (23) | | 26 (28) | |
| Non-trainee | | 133 (59) | 32 (24) | | 21 (16) | |
| **Physician status** | 225 | | | .05 | | .08 |
| Physician | | 197 (88) | 42 (21) | | 45 (23) | |
| Non-physician | | 28 (12) | 11 (39) | | 2 (7) | |
| **EHR Experience** | 220 | | | .13 | | .02 |
| Experienced | | 169 (77) | 34 (20) | | 42 (25) | |
| In-experienced | | 51 (23) | 16 (31) | | 5 (10) | |
| **Per session workload** | 223 | | | .99 | | .14 |
| < 7 patients | | 96 (43) | 22 (23) | | 25 (26) | |
| ≥ 7 patients | | 127 (57) | 29 (23) | | 22 (17) | |
| **Weekly clinic sessions** | 222 | | | .99 | | .24 |
| < 4 sessions | | 133 (60) | 30 (23) | | 32 (24) | |
| ≥ 4 sessions | | 89 (40) | 20 (23) | | 15 (17) | |
| **Hospital affiliation** | 209 | | | .62 | | .10 |
| Hospital A | | 110 (53) | 27 (25) | | 19 (17) | |
| Hospital B | | 99 (47) | 21 (21) | | 27 (27) | |

inherently alter clinicians' baseline communication skills and may actually increase patient satisfaction with care.[17,18] One first step for clinicians who are concerned about the social aspects of computer use with patients is ensuring the proper placement of the computer within the room, as noted by one of our respondents and other researchers.[7,17] Hardware upgrades may also be necessary to improve ergonomics and increase efficiency.

From workflow and technical standpoints, clinicians were concerned with the speed of the EHR and about using EHRs when they fell behind schedule. Of course, a major goal of clinical decision support applications should be to fit clinicians' workflow and maximize speed.[4] Other studies have found that the use of EHRs result in no change in available visit time,[18] do not increase clinic time,[19] and can eventually lead to an increase in productivity.[20] Among clinics that had implemented EHRs, improved workflow was the second most highly rated perceived benefit of having an EHR, only after improving access to medical information.[10] Future enhancements to EHRs focused on efficiency, navigation, and the user interface may increase EHR use during patient visits and increase the effectiveness of clinical decision support. Rather than being a characteristic of early adopters, complete documentation, by saving clinicians time, could actually be the lever by which non-users become users.

From a professional standpoint, some clinicians feel it is important to write longer prose notes. Presumably, clinicians feel there is downstream value to having such notes. Future studies should address if the value of such documentation outweighs the efficiencies gained with writing more succinct notes, especially if the latter allow for greater interaction with clinical decision support. In addition, future studies should assess a broad range of patient, clinician, and health systems outcomes resulting from greater information technology adoption, open to the possibility that increasing EHR use during patient visits could have both positive and negative effects.

Finally, it should be remembered that interaction with a computer at the time of the visit is not necessarily required for clinical decision support systems to be effective. Some paper-based clinical decision support systems have been effective, and clinical decision support associated only with e-prescribing can improve quality and safety. Something like our own mini-face sheet may be a good transitional solution with which to provide reminders to clinicians who do not use the EHR during patient visits. Nevertheless, for certain types of decision support – for example, discouraging use of antibiotics for acute bronchitis – computer-based decision support during the visit is most likely to be effective.[3,5]

*Limitations*
Our survey and analysis has limitations that should

be considered. First, we conducted this survey in an academically affiliated, electronically sophisticated group of primary care clinics. The results may not generalize to other practice types. Second, our response rate was fair and, as with any survey, respondents may not be representative of all clinicians surveyed. Because the survey was electronic, clinicians who are more oriented towards technology may have been more likely to participate. Also, the $20 gift certificate may have been a greater inducement to trainees than to non-trainees. Third, we assessed self-reported behavior and barriers, not actual behavior and barriers. Fourth, our definitions of the degree of EHR use during visits were proxies for actual interaction with the EHR and EHR-based clinical decision support. A clinician who used very little EHR functionality during visits could pay rigorous attention to reminders, prompts, and order sets. Conversely, a clinician who always completed his or her documentation during the visit might pay no attention to clinical decision support. Despite this, our definitions of "non-use" and "intensive use" have good face validity as proxies for interacting a little or a lot, respectively, with clinical decision support. Future studies should investigate the effectiveness of electronic decision support in these clinician subgroups and further refine these definitions.

## Conclusions

In a cross-sectional survey of primary care clinicians, we found that a majority of clinicians do not fully utilize the EHR during patient visits. Non-physician clinicians were marginally less likely to fully use the EHR during patient visits, but no other clinician or system factors were associated with non-use. Clinicians did not use the EHR during patient visits because of social, workflow, technical, and professional barriers. EHR developers and healthcare system leaders must address these barriers and test interventions designed to surmount them if clinicians are to use EHRs in the presence of patients and realize the full potential of in-office clinical decision support.

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